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HOW TO...

SELECT TREES WITH FUSIFORM RUST FOR REMOVAL IN THINNING

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Introduction

More than 1.5 billion pine trees in the southern United States have fusiform rust infections on their stems. Fusiform rust can greatly reduce yields of pine poles, sawtimber, and other solid wood products. The selective removal of rust-infected trees during thinning can:

- Salvage potential mortality
- Improve stand quality
- Maximize tree growth
- Improve stand health

The success of thinning in rust-infected stands depends on recognizing the potential for reductions in tree growth, mortality and product degrade. This handbook provides guidelines for selecting trees with fusiform rust for removal in thinning.

RUST CONSIDERATIONS

Stem Girdling—True stem infections in seedlings usually kill a tree by the time it is 5 years old. Most galls on older trees are of a type that originate on branches and grow into the main stem. Severity of stem girdling is the rust characteristic most closely related to poor tree health. Generally, trees with more than 50 percent of the stem girdled by at least one gall have a high potential for growth loss, degrade, and mortality (figure 1).

Figure 1.— More than 50 percent of stem girdled.

Number of Galls—The number of stem galls should also be considered in deciding which trees to remove when thinning. Trees with two or more galls have a moderate to high potential for growth loss and degrade. The potential for volume loss increases as the percentage of the stem girdled by rust galls increases.

Location of Galls—Surveys show that more than 70 percent of all stem galls occur in the first 16 feet of a tree. Degrade of sawtimber volume is greatest when galls are located within the initial 8 feet of the first sawlog. These trees are also highly susceptible to breakage by wind. Galls within 1 foot of the ground or above 16 feet have little effect on the value of sawtimber.

THE IMPACT OF RUST ON TREES

Mortality—The risk of mortality is high for trees that contain two or more stem galls and at least one of them girdles 50 percent or more of the stem circumference (table 1). Trees with severe stem girdling and only one stem gall have a moderate risk of mortality. Losses are likely to be low for trees with less than 50 percent stem girdling regardless of the number of stem galls. The influence of rust characteristics on tree mortality is similar for slash and loblolly pine.

Table 1.—Risk of tree mortality, growth loss, and degrade associated with the severity and number of fusiform rust stem galls

Severity[1]	Stem galls	Risk		
		Mortality	Growth loss	Degrade
Percent	Number			
<50	1	Low	Low	Moderate
	≥2	Low	Moderate	High
≥50	1	Moderate	Moderate	High
	≥2	High	High	High

[1] Severity = Percentage of stem circumference girdled by the most severe gall.

Growth Loss—Trees with multiple galls on the stem or with more than 50 percent of the stem girdled by at least one gall often sustain a reduction in growth. Growth losses associated with the above rust characteristics are generally greater in slash pine than in loblolly pine.

Degrade—Galls on the stem result in loss of quality fiber and cause degrade in forest products. If the trees are used for pulp, there is a loss of fiber and increased costs in the pulping process but the gall wood can be used. Rust can cause significant losses, however, if the product is lumber. This loss is affected by the number of stem galls and their location. Any tree with three or more galls in the lower 16 feet has little product value and should be removed when thinning.

PRIORITIES FOR TREE REMOVAL

Priority for tree removal is determined by potential losses associated with rust characteristics. The number and types of trees removed when thinning stands will depend on the desired residual spacing, stocking level, stand composition, and management objectives.

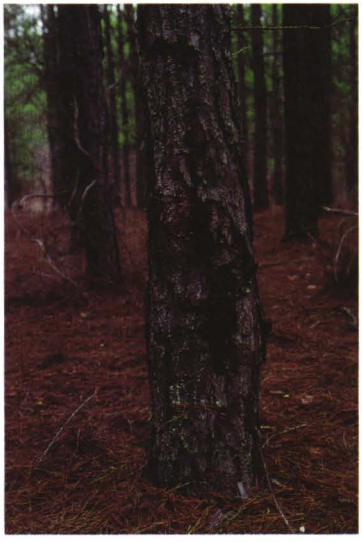

Figure 2.—Priority 1 when thinning. Fifty percent or more of stem is girdled by at least one gall.

Figure 3.—Priority 1 when thinning. Three or more galls in first 16 feet.

Removal Priority 1: High-Risk Trees

Trees with 50 percent or more of stem girdled by at least one gall (figure 2) or three or more galls in first 16 feet (figure 3). These rust conditions commonly result in mortality, significant growth loss, severe degrade, and increase the likelihood of tree breakage.

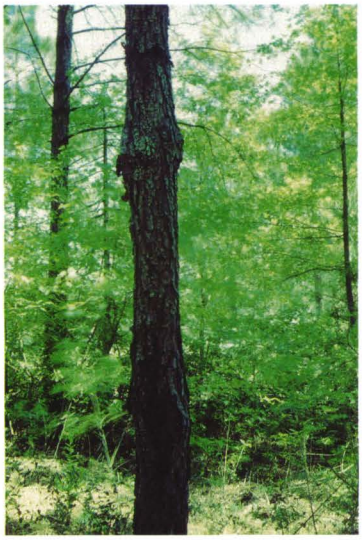

Figure 4.—Priority 2 when thinning. Two galls in first 16 feet and less than 50 percent of stem girdled.

Removal Priority 2: Moderate-Risk Trees

Trees with two galls in first 16 feet and less than 50 percent of the stem girdled (figure 4). These conditions are associated with low probability of mortality, moderate growth loss, and significant degrade.

Removal Priority 3: Low-Risk Trees

Trees with one gall in first 16 feet and less than 50 percent of stem girdled (figure 5). These conditions ordinarily cause low mortality, little growth loss, and moderate degrade.

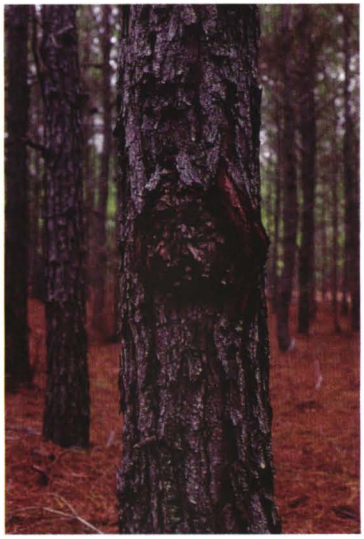

Figure 5.—Priority 3 when thinning. One gall in first 16 feet and less than 50 percent of stem girdled.

Figure 6.— The selective thinning of high-risk trees improved the quality of this pine plantation.

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